Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 38. October, 1936. No. 454.

STUDIES IN THE GENUS NAJAS IN THE NORTHERN UNITED STATES

R. T. Clausen

(Plates 437 and 438)

During the last few summers, while investigating the aquatic vegetation of some of the waters of New York for the New York State Conservation Department, Division of Biological Survey, Dr. W. C. Muenscher and the writer have collected a considerable amount of material of species of *Najas*. These collections, including one old world species previously unknown in North America, afford us a much fuller picture of the distribution of the genus in New York than has been previously possible. The writer has also had opportunity to collect in various parts of New Jersey, where several new stations were discovered for the rarer species of *Najas* in that state. This field work has led to a rapid survey of the material of *Najadaceae* preserved in the larger eastern herbaria. All of the collections of *Najas* available at the Gray Herbarium, the National Herbarium, the herbarium of the New York Botanical Garden, and the herbarium at Cornell University have been examined. The writer wishes here to express his appreciation to the authorities of these institutions for the privilege of availing himself of their facilities. As a result of these herbarium studies, it has been possible to gain a general idea of the ranges of our North American species of *Najas* as they are at present known.

Najas has probably been as much misidentified and misplaced in herbaria as any group of the narrow-leaved type of aquatics. It is not unusual in going through a collection of this genus to find placed

in the covers labelled *Najas*, specimens of genera of the *Characeae*, narrow-leaved *Potamogeton*, *Zannichellia*, *Lagrosiphon*, *Elodea*, and even *Ceratophyllum*. Consequently one is never sure that he has seen all of the material in a given herbarium, because there is always the possibility of specimens of *Najas* being misplaced in the covers of any of these other genera. A student of *Najas* must be prepared to look in a variety of places for the objects of his study.

Important contributions to the knowledge of the genus have been made by Magnus,[1] Rendle,[2] and Fernald.[3] Magnus was particularly interested in the anatomy of the group. His thesis for the degree of Doctor of Philosophy from the University of Berlin was a "*Beitrage zur Kenntniss der Gattung Najas L.*" Prof. Fernald has called attention to the best characters by which the northern North American species may be recognized and has defined their ranges. Rendle's monograph represents the most recent attempt to treat the *Najas* flora of the world. He provided keys and detailed statements of ranges as they were known at the time when he was writing. He listed four species as native to North America; *N. marina*, *N. flexilis*, *N. microdon* (*N. guadalupensis*), and *N. gracillima*, *N. conferta*, now known from southern Florida, was reported by him from Cuba and Brazil. *N. minor*, which is now recorded from North America, was noted from Europe, Asia, and northern Africa. Since Rendle's paper, no new species of *Najas* has been described from North America until 1935, when Rosendahl and Butters[4] published *N. olivacea* from Minnesota. In the following discussion this species will be mentioned under *N. guadalupensis*.

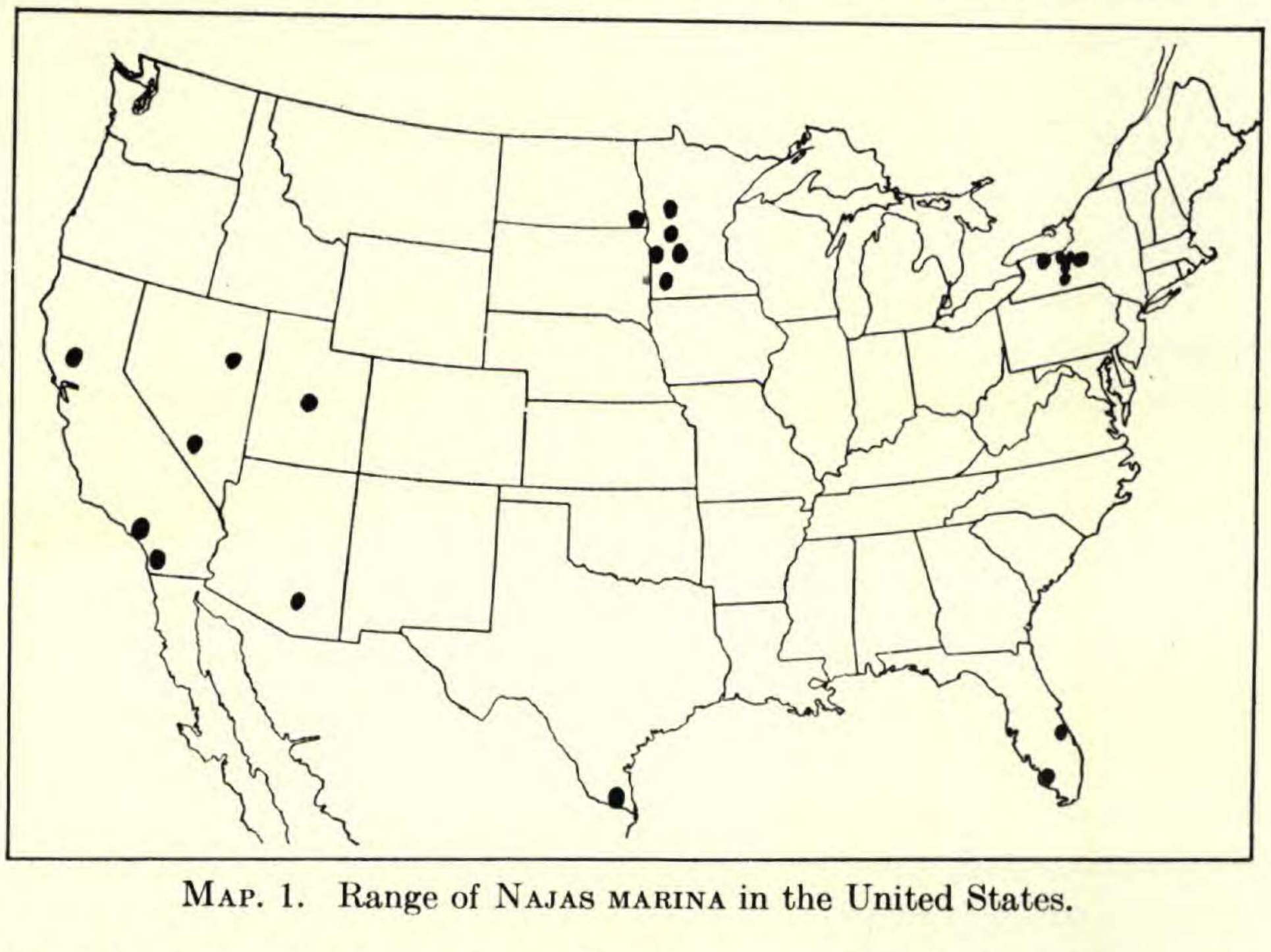
In preparing a key to our northeastern forms, it was found that characteristics such as length and breadth of seeds, leaves, and stems, though often of great help relatively in making determinations, are subject to great variation. Statements of size to tenths of millimeters are of little value when measurements of structures in the same species may vary several whole millimeters plus or minus.

Key to the northeastern North American Species of Najas

1. Leaves coarsely and conspicuously toothed (spines discernible without a lens). Internodes and backs of leaves often spiny. Seeds large, usually 4–5 mm. long, 2–3 mm. wide, finely reticulate. Plants dioecious ..... *N. marina.*
1. Leaves almost entire or finely toothed (spines usually not discernible without a lens). Internodes and backs of leaves never spiny. Seeds more slender and smaller, 4 mm. long or less, 2 mm. wide or less. The seed-coat variously reticulate. Plants monoecious ....2.

2. Leaf-bases broadly and truncately lobed or auriculate....3.
   3. Leaf-bases broadly and truncately lobed. Areolae of seed-coat much broader than long, arranged in regular vertical rows. Leaves somewhat recurved.....*N. minor.*
   3. Leaf-bases auriculate and scarious, decidedly spiny-toothed. Seeds very slender, often with a slight tendency to be curved. Areolae longer than broad, sunken in, giving the seed-coat a decidedly roughened appearance. Leaves not recurved.....*N. gracillima.*
2. Leaf-bases not broadly and truncately lobed or auriculate, but little enlarged and sloping....4.
   4. Seed-coat smooth and lustrous, very finely reticulate (30–40 rows of areolae across the seed). Styles long and filiform, 1 mm. or more long. Leaves finely and closely spined.....*N. flexilis.*
   4. Seed-coat dull, coarsely areolate, 10–20 rows of areolae across the seed. Styles short and stout, 0.5 mm. long or less. Leaves usually finely, but remotely spined. *N. guadalupensis.*

N. MARINA L. Prof. Fernald[5] has well discussed the distribution of this species in New York state. Since 1923 no new collections of *N. marina* have been made in the Atlantic coastal region north of



MAP. 1. Range of NAJAS MARINA in the United States.

Florida, although the species might be expected to be found in many places between New York and Florida.

In the middle western region, particularly in Minnesota and in North Dakota, a number of collections have been made. Rosendahl and Butters[6] mention the occurrence of *N. marina* at Lake Minne-

waska, Pope Co. and at Big Stone Lake, Big Stone Co., Minnesota. Other collections from this state include: *I. V. Shunk & W. E. Manning* 539, North Ten Mile Lake, Ottertail Co.; *Jones & Hotchkiss* 4002, Upper Norway Lake, Kandiyohi Co.; *F. P. Metcalf* 1966, Kandiyohi Lake, Kandiyohi Co.; *F. P. Metcalf* 1986 & 1972, Wagonda Lake, Kandiyohi Co.; and *F. P. Metcalf* 1841, Glacier Lake, Murray Co. Metcalf has also collected this species at Elsie Lake (M. 60) and at Mud Lake (M. 148), both near Hankinson, North Dakota.

No material from Michigan has been seen.

From Florida the writer has studied material from two different stations: *A. H. Curtiss* 2705, Palm Creek near Cape Romano; and *E. Palmer* 533, Sand Point, Indian River. Morong's var. *gracilis*, exemplified by the Palm Creek collection of Curtiss and by part of the Palmer collection, seems merely to be a narrow-leaved form of the typical *marina*. The rest of the Palmer collection is the broad-leaved form which matches exactly specimens from central New York.

West from Florida, the species has not been collected any nearer than 15 miles north of Brownsville, Texas, where it was secured by *Robert Runyon*, no. 187. Another Texan collection is "Las Frosnos in Risoco," *Runyon*, no. 185. From the West material has been seen from the Santa Cruz River in Arizona; Central Utah; Ash Meadows and the Huntington Valley in Nevada; and from three stations in California, the northernmost of these being *H. N. Bolander*, 2658, Clear Lake, Lake Co.

Material of *N. marina* has also been examined from Lower California; Guaymas, Sonora, Mexico; Cuba; Haiti; Porto Rico; Salvador; Venezuela; France; Norway; Sweden; Germany; Austria; Hungary; Italy; Sicily; Egypt; Belgian Congo; Asia Minor; Afghanistan; India; Manchuria; Japan; Hawaiian Islands; and Galapagos Islands. Rendle has described many geographical varieties, but attempts by the writer to place the forms from the aforementioned localities in their respective regional races has proved highly unsuccessful. So much material is now available as to break down the fine distinctions made by Rendle, who evidently had only single specimens in many cases on which to base his varieties. A detailed study of the forms of *N. marina* must be carried out before specific statements may be made as to the subdivisions of the species and their distribution.

N. MINOR Allioni. While collecting in the waters of the Hudson River at Troy and Waterford, at the mouth of the Mohawk River,

on August 21 and 22, 1934, great beds of a strange species of *Najas* were discovered by Dr. W. C. Muenscher and the writer. The plants were bushy and much branched, growing in shallow water, and had a characteristic appearance because of the recurved habit of the foliage. The leaves were slender, but not so much so as in *N. gracillima*, and relatively coarsely spined. A week later, we found the same plant growing on a tidal mud-flat about one mile south of Stuyvesant, Columbia Co., New York. Finally, on September 3, we found the plant in the Watervliet Reservoir in Albany Co. See PLATE 437.

When we worked over our 1934 collections later in the year, we were puzzled by the specimens of this *Najas*. Was it an aberrant form of *N. gracillima*, a new species, or another tropical or sub-tropical form, which, like *N. guadalupensis*, was reaching its northern limits in our area? The scarcity of fruits on our specimens served to support this last line of reasoning. The writer tried to match the specimens with material of *N. conferta* from Florida, but this did not work at all. Turning through Rendle's treatment in Engler's "Das Pflanzenreich," we noted fig. 1 D, showing the habit of *N. minor*, and fig. 4 S and T, showing the seeds, fresh and fossil, of the same species. Here was our plant depicted, with the same habit and transversely reticulate seeds as had been observed in the Hudson River material! Our plants matched exactly European specimens of *N. minor*.

MAP 2. Range of NAJAS MINOR in New York.

Although the 1934 material exhibited a paucity of fruits, collections at Troy and Waterford in September, 1935, by W. C. Muenscher and O. F. Curtis, jr. contained specimens which were abundantly fruiting.

Recalling Svenson's[7] collection of *N. gracillima* in the shallow water of the Hudson above Waterford, we wondered whether this might not also be *N. minor*. Examination of this material at the Gray Herb-

arium, however, showed it to be typical *N. gracillima.* A search through the *Najas* material of several eastern herbaria failed to reveal any further specimens of *N. minor* from North America. Specimens from the herbarium of George Engelmann of St. Louis, Mo. were collected by A. Braun in Berlin, in 1865.

Najas minor is undoubtedly of recent introduction in New York. The fact that none of the many other botanists who have worked over this area had ever collected it would seem to support this view. There are several ways by which the plant may have come in. Seeds or parts of the plants themselves may have been brought here on shipping from Europe. There is even the possibility that the plant had been grown in an aquarium and then dumped into the river. Intentional introduction is possible but not likely. On September 14, 1935, Dr. W. C. Muenscher threw fragments of plants of *N. minor* into the shallow water of Cayuga Lake off the Canoga Marshes. *Najas marina* is common in this part of the lake. Whether *N. minor* will thrive there remains to be seen.

In the herbarium, *N. minor* may be at once recognized by its very narrow, coarsely toothed leaves, with broadly truncate bases. The seeds are slender, 2–3 mm. long and .4–.6 mm. wide, with vertical rows of numerous areolae, which are much broader than long, giving the seed-coat a scalariform appearance.

The following collections, all in New York, may be cited: *Muenscher and Clausen* 4279, mouth of Mohawk River at Waterford, Saratoga Co., August 21, 1934; *M. & C.* 4281, mouth of Mohawk River at Waterford, Saratoga Co., August 22, 1934; *M. & C.* 4282, Watervliet Reservoir, Albany Co., September 3, 1934; *M. & C.* 4280, tidal mud flat about one mile south of Stuyvesant, Columbia Co., August 28, 1934; *M. & Curtis* 4825, backwater of Mohawk River, Waterford, Saratoga Co., September 10, 1935; and *M. & Curtis* 4826, junction of Mohawk and Hudson Rivers, Troy, Rensselaer Co., September 10, 1935. Plants of *N. minor* were also found on the mud-flat in the river between Hudson and Athens, in Greene Co. Unfortunately, the material from this station was not preserved.

Material of *N. minor* has been examined from France, Germany, Austria, Hungary, Egypt, India, the Malay Peninsula, and Japan.

N. GRACILLIMA (A. Br.) Morong. The experience of intensive collecting during the last few years would seem to indicate that *N. gracillima* is not nearly so localized as was first supposed. The plant

is very characteristic in appearance and can not be confused with any of the other native species of the genus, although certain puzzling forms, possibly of hybrid origin, can not be satisfactorily placed.

In New York, *N. gracillima* was first collected in the ponds west of Albany by C. H. Peck. Since then it has been found at several places on Long Island and in the watersheds of the Hudson, Mohawk, Indian, Grass, Raquette, Delaware, and Susquehanna Rivers. It has also been collected in the Lake Champlain watershed. In 1934, Muenscher and Clausen[8] listed several inland stations in New York for *N. gracillima.* To these may now be added the following: *M. & C.* 4274, Middle Stoner Lake, Fulton Co.: *M. & C.* 4275, Canada Lake, Fulton Co.; *M. & C.* 4276, East Caroga Lake, Fulton Co.; *M. & C.* 4277, Lily Lake, Fulton Co.; and *M. & C.* 4278, Glass Lake, Rensselaer Co. In 1935, Muenscher and Curtis collected the species in two new localities; M. & C. 4822, Mutton Hill Pond, Apalachin, Tioga Co., in the Susquehanna Watershed; and M. & C. 4828, Round Lake near Roscoe, Sullivan Co., in the Delaware Watershed. In the Gray Herbarium is a collection by H. K. Svenson, no. 1904A, from Franklin Co., N. Y. This is a single fragment of *N. gracillima* collected with Potamogeton in the shallow water at the north end of Loon Lake on Aug. 24, 1927.

MAP 3. Range of NAJAS GRACILLIMA.

M. & C. no. 4275, from Canada Lake, Fulton Co., N. Y. consists of two things collected together and growing side by side. The one is typical *Najas gracillima.* The other is a slender form with *flexilis*-like fruits. The seeds are 2–2.2 mm. long, the seed coats smooth and polished, and the style in flowering material 1.5 mm. long. The sheath of the upper leaf at each node is lobed and sharply toothed with 6–8 slender spines. The leaves and stems are capillary. This material may be either *N. tenuissima,* a European species native in Finland, which it matches pretty well, or a hybrid between *N. flexilis*

and *N. gracillima*. There seems to be no good reason why species of Najas should not cross, although no examples of this have until now been described. Certainly our Canada Lake specimens seem to be entirely intermediate between the two above species. M. & C. 4265, from Pine Lake, Fulton Co. exhibits this same intermediate character.

Inland in Massachusetts *Najas gracillima* is now known from Wood Pond, Ludlow, Hampden Co., where it was collected on the muddy pond bottom by F. C. Seymour, no. 427, on Aug. 25, 1925. It has also been collected in a pond at Deerfield, Franklin Co. by Walter Deane, on Aug. 10, 1887.

In New Jersey Svenson[9] collected *N. gracillima* in a pond hole east of Cedar Lake. In his note in Rhodora he also mentioned the four other classical New Jersey stations for the species: Delanco, Burlington Co.; mouth of Cooper's Creek, Camden Co.; Palatine, Salem Co.; and Woodstown, Salem Co. The writer has seen material from all of these stations except the one at Palatine. There are two other collections from the state which until now have apparently been overlooked. These were both by K. K. Mackenzie; no. 5691, shores of Delaware River at Kinkora, Burlington Co., Sept. 1913; and no. 6288, south end of Denmark Pond, Morris Co., Sept. 13, 1914. Sheets of these numbers are deposited in the herbarium of the New York Botanical Garden.

In 1935, *N. gracillima* was collected in a small sandy bottomed bay at the southern end of Green Pond, Morris Co., N. J., A. P. & R. T. Clausen, no. 1191. Here the species was growing in the typical association with which it was found in the Adirondack Lakes: *Isoetes Braunii*, *Potamogeton capillaceus*, *Eriocaulon septangulare*, *Brasenia Schreberi*, *Elatine minima*, *Utricularia purpurea*, and *Lobelia Dortmanna*.

Specimens collected by Taylor at Spotswood, Monmouth Co., N. J. and labelled *N. gracillima* are definitely not Najas. Material in the Mackenzie Herbarium labelled *N. gracillima* from Catfish Pond, Stillwater, Sussex Co., N. J. is *Potamogeton pectinatus*.

From Pennsylvania, *N. gracillima* is known from Bristol, Bucks Co. (Diffenbaugh, July 26, 1868) and from the Lehigh River at Easton, Northampton Co. (Morong, Aug. 7, 1891).

In the Atlantic coastal region, *N. gracillima* is also known from Delaware and Maryland. The following sheets may be cited: A. Commons, in Nanticoke River at head of tidewater, Seaford, Sussex

Co., Delaware, Aug. 31, 1882; Forrest Shreve and W. R. Jones 1200, Shad Point, Wicomico River, Wicomico Co., Md., Aug. 17, 1906; and W. L. McAtee 2766, pool at Widewater, Great Falls, Montgomery Co., Md., Aug., 1917.

W. N. Keck and C. F. Stillwell, no. 380, first collected *N. gracillima* in Minnesota on Aug. 2, 1926, at Dudley Lake in Rice Co. A year later, Rosendahl,[10] no. 5509, collected the species in a small lake in northwestern Ramsey Co. There are also three stations for Wisconsin.[11] In the herbarium of the New York Botanical Garden are some specimens of *N. gracillima* sent in a letter from Dr. Gray to Wm. Boott. These may have been obtained in Michigan, although there is some doubt about this possibility. Search should now be made for the plant in the area between Tioga Co., N. Y. and Wisconsin.

N. FLEXILIS (Willd.) Rostk. & Schmidt. This species, common in the northeastern part of the United States and eastern Canada, is exceedingly variable in appearance. In small, shallow ponds, it often assumes a squat bushy character, while in the waters of our rivers it develops long slender stems with slender leaves and even more slender fruits. There is great variation in the size and shape of the seeds of *N. flexilis*. The writer has tried to break up the species on a basis of seed characters, but all his attempts thus far have been unsuccessful. It was first thought that the coastal plain forms exhibited short plump seeds, while the inland forms had more slender, elliptical seeds. There are so many specimens available to disprove this idea that it had to be abandoned. Different forms of the species do occur, but the characters, such as width of leaves, size and shape of seeds, and habit, occur in all sorts of combinations and can not be correlated with geographical areas to give definite geographical races or varieties which are worth naming.

Prof. Fernald[12] stated that to the west of Iowa and Minnesota the species seems to be only in Idaho, Oregon, Washington, and British Columbia. I have at hand only two records for the area in between, and these both from South Dakota, adjoining Minnesota: Corbett and Williams, no. 12, in shallow water of Lake Hendricks, Aug. 8, 1894; and C. & W., no. 178, shallow water of Big Stone Lake, Aug. 15, 1894. The collection of F. P. Metcalf, no. 867, from Bull Lake, Boone Co., Missouri, seems to be *N. flexilis*, but material examined from Kansas and Nebraska seems to be highly questionable.

In the east, the southern limits of the range of *N. flexilis* are still

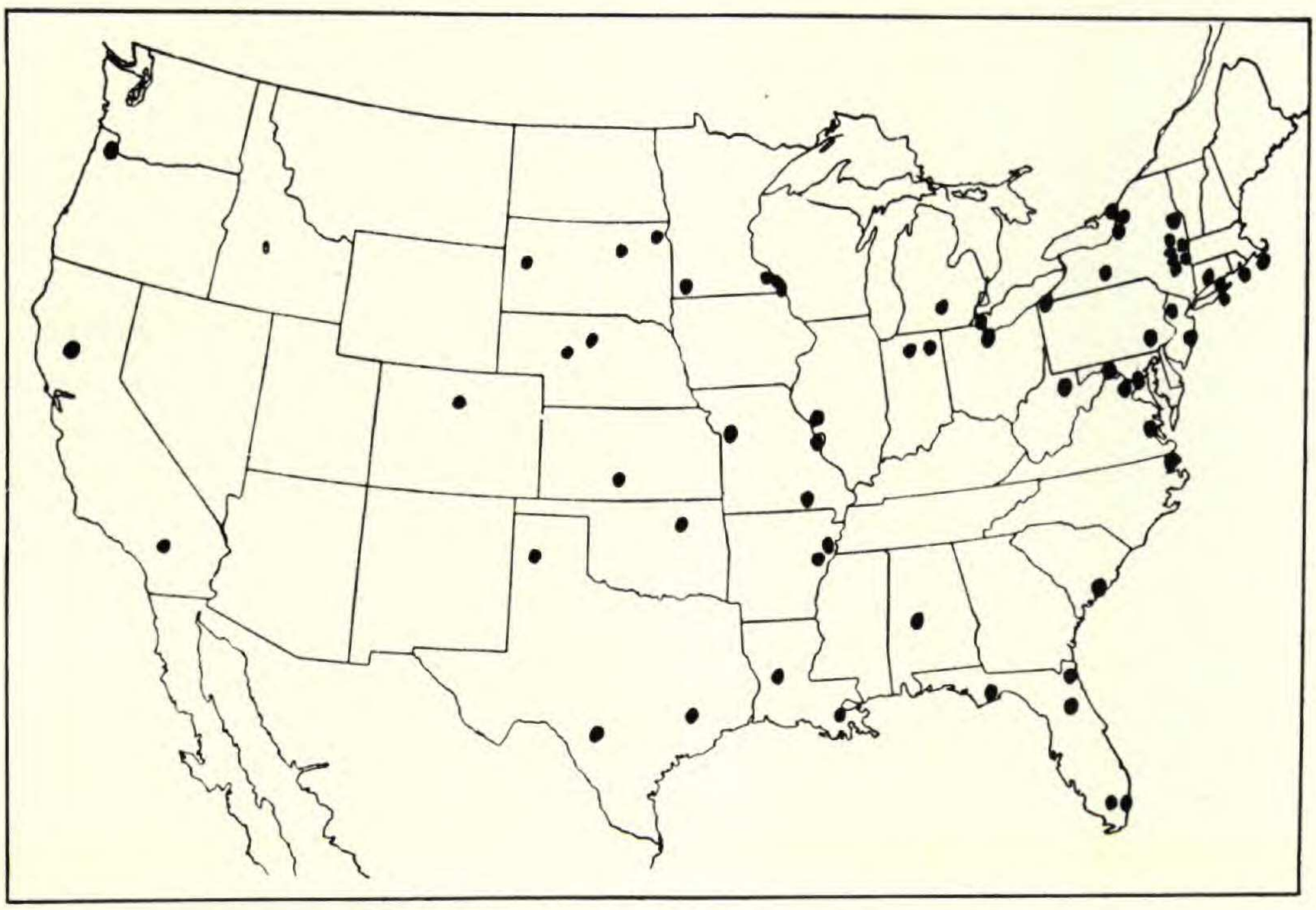
poorly worked out. The collection, no. 2275 of W. L. McAtee, from Hunting Creek, Va. may possibly be *N. flexilis*, but the condition of the material is such that positive determination is well nigh impossible. There is a doubtful specimen from the vicinity of Washington, D. C., collected by Vasey in 1875. There is also another District of Columbia specimen which has much the appearance of *N. guadalupensis*, but styles 2 mm. long. Such specimens are difficult to place. The collection, Muenscher and Clausen no. 4273, from the mouth of the Mohawk River where it enters the Hudson at Waterford, Saratoga Co., N. Y., presents the same difficulty. The seeds are decidedly of the *flexilis*-type, 3.5–4 mm. long (!), the styles 1–1.2 mm. long, with the habit suggesting *N. guadalupensis*.

In New Jersey, on the coastal plain, Edwards and Clausen (1190) collected *N. flexilis* as far south as Toms River, Ocean Co., on the edge of the pine barrens. Material of *N. flexilis* has been examined from Newfoundland, Quebec, Ontario, New Brunswick, Nova Scotia, Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Ohio, Indiana, Michigan, Illinois, Minnesota, Iowa, South Dakota, Missouri, Idaho, Oregon, Washington, British Columbia, Sweden, and Germany.

N. GUADALUPENSIS (Sprengel) Morong. This seems to be an aggregate species. Certainly the material usually classified in herbaria under this name presents a decidedly heterogeneous aspect. Here as in *N. flexilis*, however, attempts by the writer to break up the species have been unsuccessful.

N. guadalupensis is a new world species, extending southward from Massachusetts, New York, and Quebec to Peru, Bolivia, and Argentina. In the northern part of its range, the species had been for a long time overlooked, probably partly because in the north it seldom produces fruit. Prof. Fernald[12] called attention to its occurrence in our northeastern flora and pointed out the characters by which it might be recognized; the short stout style and the dull, coarsely reticulate seed coat. In New York the plant was mentioned from Suffolk Co., L. I. and from Jefferson Co., at the extreme eastern end of Lake Ontario. A considerable number of New York collections have been made since 1923. These are cited here: Muenscher, Manning and Maguire 180, in deep water of South Bay, Lake Champlain, Fort Ann, Washington Co.; Muenscher and Clausen 4283, mouth of Mohawk River at Waterford, Saratoga Co.; M. & C. 4284,

Nassau Lake, Rensselaer Co.; M. & C. 4285, Kinderhook Lake, Columbia Co.; M. & C. 4286, tidal mud flat in Hudson River between Hudson and Athens, Greene Co.; M. & C. 4287, tidal mud flat in Hudson River at Coeymans, Albany Co.; M. & C. 4288 & 4289, tidal mud flats in Hudson River at mouth of Stockport Creek, Columbia Co.; and C. 1192, 1193, and 1194, Waneta Lake, Schuyler-Steuben Co. *Najas guadalupensis* is one of the commonest species of aquatics



MAP 4. Northern Range of NAJAS GUADALUPENSIS.

in Waneta Lake, a small body of water, about three miles long, on the divide between the Ontario and Susquehanna watersheds. This lake naturally drained into the Susquehanna valley, but it has recently been diverted so that it now flows through a canal into Keuka Lake and thence into Ontario. Large quantities of the Najas collected here were almost entirely sterile. Only rarely were flowers found which made positive identification possible. Some of the Rensselaer County material contained fruits more commonly. The seeds were typical of those produced on plants from the southern states.

In New Jersey, *N. guadalupensis* has seemed to be a great rarity. No specimens have been seen in herbaria and there are no published references to the species. Consequently, two recent collections seem worth recording: Edwards and Clausen 1195, shallow sandy pool

along the Atlantic coast at Mantoloking, Ocean Co.; and Edwards, Bowen, Highton, Rusling, and Clausen 1196, Budds Lake, Morris Co.

On Aug. 2, 1933, Muenscher and Lefler collected a peculiar Najas (18239) in three to four feet of water off the Canoga Marshes in Cayuga Lake, N. Y. Specimens of this collection have been studied by the writer. The plants are slender, 40 cm. long or more, and somewhat bushy, rooting at the nodes. The leaves are lanceolate, abruptly acute, broad and sheathing at the base, and finely and sharply toothed with 50–75 teeth on a margin. The sheath of the upper leaf at each node is wider than that of the lower, and the sheaths are about 3 mm., with their margins finely spined, 8–12 spines on a side. The material is absolutely sterile.

In 1934 and again in 1935, attempts to rediscover the station for this plant and to secure fruiting material were spoiled by adverse weather conditions. The lake was so rough when we visited the spot in 1935 that we could not see anything in the water.

This Cayuga Lake material seems most closely related to *N. guadalupensis*, which the writer reluctantly labelled it. When *N. olivacea*[14] was published, we eagerly read the description of the species and compared it with our plants. So far as we can tell from non fruiting material, this collection from Cayuga Lake represents the same plant which Rosendahl and Butters have described. Until flowering and fruiting specimens have been secured and studied, a definite opinion can not be rendered on the validity of this form in our New York flora.

The collection of J. K. & G. K. Small, no. 4385, from the shores at the mouth of the Kissimmee River, at the northern end of Lake Okeechobee, Florida, probably represents an undescribed species, allied to *N. guadalupensis*. The seeds are 1.8–2 mm. long, .8 mm. wide, and roughly and coarsely reticulate. The styles are stout, .6–1 mm. long. The leaves are .8–1 mm. wide and 1.5–2 cm. long, regularly and coarsely toothed with 15–20 teeth on each margin. It is hoped that more material of this form may be collected before any further disposition of it might be made.

Material of *N. guadalupensis* has been examined from Massachusetts, New York, Quebec, New Jersey, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Florida, Ohio, Indiana, Michigan, Illinois, Minnesota, South Dakota, Nebraska, Kansas, Missouri, Arkansas, Alabama, Louisiana, Texas, Oklahoma, Colorado,

Oregon, California, Lower California, Cuba, Haiti, Dominican Republic, Jamaica, Porto Rico, Guadaloupe, Curacao, Mexico, Guatemala, Honduras, Salvador, Nicaragua, Colombia, Venezuela, Peru, Bolivia, and Argentina.

The writer wishes to thank Dr. W. C. Muenscher for permission to study certain of his collections and for his hearty cooperation in the preparation of this paper.

Bailey Hortorium,
New York State College of Agriculture,
Ithaca, N. Y.

List of Cited References

1. Magnus, P. Beitrage zur Kenntniss der Gattung Najas. v–viii, 1–63. Berlin, 1870.
2. Rendle, A. B. A Systematic Revision of the Genus Najas. Trans. Linn. Soc. London. Ser. 2, **5** (Bot.): 379–436. pl. 39–42. 1899; Supplementary Notes on the Genus Najas. Trans. Linn. Soc. London. Ser. 2, **5** (Bot.): 437–444. 1900.
3. Fernald, M. L. Notes on the Distribution of Najas in Northeastern America. Rhodora **25:** 105–109. 1923.
4. Rosendahl, C. O. and Butters, F. K. Rhodora **37:** 345–348. 1935.
5. Fernald, M. L. Rhodora **25:** 106–107. 1923.
6. Rosendahl and Butters. Rhodora **37:** 345. 1935.
6a. Muenscher, W. C. New York Cons. Dept. Report. A Biological Survey of the Mohawk-Hudson Watershed. No. **9:** 244. 1935.
7. Fernald, M. L. Rhodora **25:** 109. 1923.
8. Muenscher, W. C. and Clausen, R. T. Rhodora **36:** 405. 1934.
9. Svenson, H. K. Rhodora **37:** 414. 1935.
10. Rosendahl and Butters. Rhodora **37:** 346. 1935.
11. Fassett, N. C. Rhodora **36:** 349–350. 1934.
12. Fernald, M. L. Rhodora **25:** 107. 1923.
13. Fernald, M. L. Rhodora **25:** 107–109. 1923.
14. Rosendahl and Butters. Rhodora **37:** 347–348. 1935.

Wiley's "Ferns of Northeastern United States."[1]—It is now possible to obtain a pocket manual of ferns of the same general character as Chester Reed's little guides to the birds. Miss Farida A. Wiley of the American Museum of Natural History has put out a slender, flexibly bound volume, 4 by 6⅜ inches, designed to fit comfortably into pocket or hand-bag and, with the aid of copious illustration, brief, strictly non-technical descriptions and a carefully worked-out key to sterile fronds, to furnish an easy and painless method of naming, in the field, the species to be met with in New England and the middle Atlantic states. The little book should help the beginner toward an acquaintance with ferns; but, in view of the fact that six of the drawings are misnamed, the statement in the foreword that "by a novel method[2] . . . even the uninitiated can readily identify ferns without fear of error" seems a bit too hopeful.—C. A. W.

[1] Wiley, Farida A. Ferns of Northeastern United States. Published by the author, 1936. 98 pp., many cuts. $1.00.

[2] Wherein the novelty lies is not explained, nor is it obvious.